

Current Status of All Claims in the Application:

1. (Previously Presented) A measurement system for measuring the position of a stage, the measurement system comprising:

a first system comprising a first beam source that directs a first beam on a first path and a first redirector that is secured to the stage, the first redirector redirecting substantially all of the first beam so that the redirected first beam is on a first redirected path that is 90 degrees from the first path even if the first redirector is rotated a small angle about an axis; wherein the first redirected path is parallel with a first axis, the first path is parallel with a second axis, and the first system measures the sum of the position of the stage along the first axis and along the second axis.

2. (Original) The measurement system of claim 1 wherein the first redirector includes a penta-prism.

3. (Original) The measurement system of claim 1 further comprising a first reflector that is positioned away from the stage, wherein the first redirector redirects the first beam at the first reflector and the first reflector reflects the first beam back at the first redirector.

4. (Original) The measurement system of claim 1 wherein the first redirected path is parallel with a first axis, the first path is parallel with a second axis, and the first redirected path is 90 degrees from the first path even if the first redirector is rotated approximately 0.1 degree about a third axis.

5. (Original) The measurement system of claim 1 wherein the first redirected path is parallel with a first axis, the first path is parallel with a second axis, and the first redirected path is 90 degrees from the first path even if the first redirector is rotated approximately 1 degree about a third axis.

6. (Original) The measurement system of claim 1 further comprising an additional system comprising a second beam source that directs a second beam on a second path that is parallel with the first path; and a second redirector that redirects the second beam so that the redirected second beam is on a second redirected path that is 90 degrees from the second path even if the second redirector is rotated approximately 0.1 degree about an axis.

7. (Cancelled)

8. (Original) The measurement system of claim 7 further comprising a second system that measures the position of the stage along the second axis, wherein the position of the stage along the first axis is calculated by subtracting the position of the stage along the second axis measured by the second system from the sum of the position of the stage measured by the first system.

9. (Original) The measurement system of claim 1 wherein the first redirected path is parallel with a first axis, the first path is parallel with a second axis, and the first system measures the position of the stage along the first axis.

10. (Original) A combination comprising a stage, a stage mover assembly that moves the stage, and the measurement system of claim 1.

11. (Previously Presented) The combination of claim 10 wherein the first system further comprises a shield that inhibits environmental conditions from influencing the first beam.

12. (Original) The combination of claim 11 wherein the shield is secured to the stage.

13. (Original) The combination of claim 11 wherein the shield defines a shield aperture and the first beam is directed through the shield aperture.

14. (Original) The combination of claim 11 wherein the shield is positioned near at least a portion of the stage mover assembly.

15. (Original) The combination of claim 10 further comprising a first optical unit that receives the redirected first beam, the first optical unit being secured to the stage.

16. (Original) An exposure apparatus including the combination of claim 10.

17. (Original) A device manufactured with the exposure apparatus according to claim 16.

18. (Original) A wafer on which an image has been formed by the exposure apparatus of claim 16.

19. (Previously Presented) A measurement system for measuring the position of a stage along a first axis, the measurement system comprising:

a first system comprising a first beam source that directs a first beam on a first path that is parallel to a second axis; and a first redirector secured to the stage, the first redirector redirecting the first beam so that the redirected first beam is on a first redirected path that is parallel to the first axis, wherein the first system measures the sum of the position of the stage along the first axis and along the second axis, wherein the first redirected path is 90 degrees from the first path even if the redirector is rotated approximately 0.1 degree about a third axis.

20. (Canceled)

21. (Previously Presented) The measurement system of claim 19 wherein the first redirector includes a penta-prism.

22. (Original) The measurement system of claim 19 further comprising a first reflector that is positioned away from the stage, wherein the first redirector redirects the first beam at the first reflector and the first reflector reflects the first beam back at the first redirector.

23. (Original) The measurement system of claim 19 further comprising a second system that measures the position of the stage along the second axis, wherein the position of the stage along the first axis is calculated by subtracting the position of the stage along the second axis measured by the second system from the sum of the position of the stage measured by the first system.

24. (Original) The measurement system of claim 19 wherein the first system includes a first optical unit that is positioned away from the stage.

25. (Original) A combination comprising a stage, a stage mover assembly that moves the stage, and the measurement system of claim 19.

26. (Previously Presented) The combination of claim 25 wherein the first system further comprises a shield that inhibits environmental conditions from influencing the first beam.

27. (Original) The combination of claim 26 wherein the shield is secured to the stage.

28. (Original) The combination of claim 26 wherein the shield defines a shield aperture and the first beam is directed through the shield aperture.

29. (Original) The combination of claim 26 wherein the shield is positioned near at least a portion of the stage mover assembly.

30. (Original) An exposure apparatus including the combination of claim 25.

31. (Original) A device manufactured with the exposure apparatus according to claim 30.

32. (Original) A wafer on which an image has been formed by the exposure apparatus of claim 30.

33. (Previously Presented) A combination for positioning a device, the combination comprising:

a stage that retains the device;

a stage mover assembly that moves the stage; and

a measurement system for measuring the position of the stage, the measurement system comprising a first system including a first beam source that directs a beam at the stage and a shield positioned near at least a portion of the stage mover assembly and adjacent to a path of the beam so that the shield inhibits environmental conditions from influencing the beam.

34. (Original) The combination of claim 33 wherein the shield is secured to the stage.

35. (Original) The combination of claim 33 wherein the shield defines a shield aperture and the beam is directed through the shield aperture.

36. (Canceled)

37. (Previously Presented) The combination of claim 33 wherein the first system includes a first redirector that is secured to the stage, the first redirector redirecting the beam 90 degrees even if the first redirector is rotated approximately 0.1 degree about an axis.

38. (Original) The combination of claim 37 wherein the first redirector includes a penta-prism.

39. (Original) The combination of claim 33 wherein the first system includes a first reflector that is positioned away from the stage, wherein the first reflector reflects the beam back at the stage.

40. (Original) An exposure apparatus including the combination of claim 33.

41. (Original) A device manufactured with the exposure apparatus according to claim 40.

42. (Original) A wafer on which an image has been formed by the exposure apparatus of claim 40.

43. (Previously Presented) A method for measuring the position of a stage, the method comprising the steps of:

directing a beam on a first path with a beam source; and

redirecting the beam with a redirector that is secured to the stage, the redirector redirecting substantially all of the beam so that the redirected beam is on a redirected path that is 90° from the first path even if the redirector is rotated approximately 0.1° about an axis.

44. (Previously Presented) The method of claim 43 further comprising the step of positioning a reflector away from the stage, the redirector redirecting the beam at the reflector and the reflector reflecting the beam back at the redirector.

45. (Original) The method of claim 43 wherein the redirected path is parallel with a first axis, the first path is parallel with a second axis, and the redirected path is 90° from the first path even if the redirector is rotated approximately 1 degree about a third axis.

46. (Original) A method for positioning a device, the method comprising the steps of providing a stage, moving the stage with a stage mover assembly, and measuring the position of the stage by the method of claim 43.

47. (Original) The method of claim 46 further comprising the step of securing a shield to the stage that inhibits environmental conditions from influencing the beam.

48. (Canceled)

49. (Canceled)

50. (Previously Presented) A method for positioning a device, the method comprising the steps of:

providing a stage that retains the device;

moving the stage with a stage mover assembly; and

measuring the position of the stage with a measurement system, the measurement system comprising a beam source that directs a beam at the stage and a shield positioned near at least a portion of the stage mover assembly and adjacent to a path of the beam so that the shield inhibits environmental conditions from influencing the beam.

51. (Original) The method of claim 50 wherein the shield is secured to the stage.

52. (Original) The method of claim 50 wherein the shield defines a shield aperture and the beam is directed through the shield aperture.

53. (Original) The method of claim 50 wherein the shield is positioned near at least a portion of the stage mover assembly.

54. (Canceled)

55. (Canceled)

56. (Previously Presented) A measurement system that measures the position of a stage along a first axis, the measurement system comprising:

a first system having a first redirector that is secured to the stage, the first system directing a first beam to the first redirector on a first path that is parallel with a second axis, and the first redirector redirecting the first beam on a first redirected path that is parallel with the first axis;

a reflector that is positioned away from the stage, the first reflector extending along the second axis; wherein

the first redirector redirects the first beam at the reflector and the reflector reflects the first beam back at the first redirector, and the first redirector redirects the first beam on a second redirected path that is parallel with the second axis; and wherein

the first redirector is configured to be insensitive to the rotation around a third axis that is orthogonal to the first and second axes about the direction redirecting the first beam from the first path; and

a first detector that is positioned away from the stage, the first detector detecting the first beam after the first beam has been redirected on the second redirected path by the first redirector.

57. (Original) The measurement system of claim 56 further comprising an additional system including a second redirector that is secured to the stage, the additional system directing a second beam to the second redirector on a second path that is parallel with the second axis, and the second redirector redirecting the second beam on a second redirected path that is parallel with the first axis; wherein

the second redirector redirects the second beam at the reflector and the reflector reflects the second beam back at the second redirector; and

the second redirector is configured to be insensitive to the rotation around the third axis about the direction redirecting the second beam from the second path.

58. (Original) The measurement system of claim 56 wherein the first redirector includes a penta-prism.

59. (Original) The measurement system of claim 56 wherein the first redirector includes a penta-mirror.

60. (Original) A combination comprising a stage, a stage mover assembly that moves the stage, and the measurement system of claim 56.

61. (Previously Presented) An exposure apparatus comprising the combination of claim 60 and an irradiation apparatus that irradiate a photosensitive substrate held by the stage with radiation to form an image on the photosensitive substrate, wherein the axis of the radiation irradiated to the photosensitive substrate is substantially parallel with the third axis.

62. (New) A method for exposing a substrate, comprising the steps of:
retaining the device on a stage;
moving the stage by a stage mover assembly;
measuring the position of the stage by a measurement system, the

measurement system comprising a first system including a first beam source that directs a beam at the stage and a shield positioned near at least a position of the stage mover assembly and adjacent to a path of the beam so that the shield inhibits environmental conditions from influencing the beam; and

irradiating an energy beam to the device.

63. (New) A method according to claim 62, wherein the shield is secured to the stage.

64. (New) A method according to claim 62, wherein the shield defines a shield aperture and the beam is directed through the shield aperture.

65. (New) A method according to claim 62, wherein the first system includes a first reflector that is positioned away from the stage, wherein the first reflector reflects the beam back at the stage.

66. (New) A method of making an exposure apparatus that irradiates an energy beam to a substrate, comprising the steps of:

providing a stage that retains the device;

providing a stage mover assembly that moves the stage; and

providing a measurement system for measuring the position of the stage, the measurement system comprising a first system including a first beam source that directs a beam at the stage and a shield positioned near at least a portion of the stage mover assembly and adjacent to a path of the beam so that the shield inhibits environmental conditions from influencing the beam.

67. (New) A method according to claim 66, wherein the shield is secured to the stage.

68. (New) A method according to claim 66, wherein the shield defines a shield aperture and the beam is directed through the shield aperture.

69. (New) A method according to claim 66, wherein the first system includes a first reflector that is positioned away from the stage, wherein the first reflector reflects the beam back at the stage.